REMARKS

Applicants respectfully request entry of amendments to claims 1 and 15, and new claims 39 and 40, and cancel claim 7, 10, 12, and 13. Claims 22-38 are withdrawn without prejudice or disclaimer. Support for the amendments and new claims can be found throughout the specification, including paragraphs [0004], [0021], [0024], [0030], [0048], and the originally filed claims and, therefore, do not add new matter.

Applicants submit that pending claims 1-6, 8, 9, 11, 14-22, 39, and 40 are in condition for allowance and respectfully request that the claims as amended be entered.

Elections/Restrictions

Applicants affirm the election, with traverse, to prosecute the Invention of Group I, claims 1-21.

Objection

Regarding the objection to the disclosure, the Office Action alleges, in pertinent part, that the entire specification is confusing because there are numerals associated with specific items, even when a diagram is not being discussed. Notwithstanding the intimated global confusion with respect to such enumerated items, Applicants submit that for the paragraph specifically recited (i.e., [0026]), paragraph [0013] clearly defines the terms (and their associated numeric identifiers) as follows:

> "'protein' **210**'polypeptide'**210** and 'peptide'**210** are used interchangeably herein to refer to polymeric molecules **120**, **210** assembled from naturally occurring amino acids, non-naturally occurring amino acids, amino acid analogs and/or amino acid derivatives."

Respectfully, 37 C.F.R. §1.84(p)(4) and (5) expressly state:

> "(4) The same part of an invention appearing in more than one view of the drawing must always be designated by the same reference character, and the same reference character must never be used to designate different parts"

"(5) Reference characters not mentioned in the description shall not appear in the drawings. Reference characters mentioned in the description must appear in the drawings."

Review of the specification shows that the same parts of the invention appearing in more than one view are always designated by the same reference number (e.g., proteins, polypeptide specifically denoted by identifier **210**; polymers [generically] are specifically denoted by identifier **120**), and the same reference character is never used to designate different parts. Further, no reference character is mentioned in the description that does not appear in the drawings, moreover, each reference character appears in the drawings. As such, Applicants meet the standard as set forth in 37 C.F.R. §1.84(p)(4) and (5). Therefore, nothing more is required.

For these reasons, Applicants respectfully request that the objection to the specification be withdrawn.

Rejection Under 35 U.S.C. §112, First Paragraph

Claims 1-21 stand rejected under 35 U.S.C. §112, first paragraph, as allegedly lacking written description support. As claims 7, 10, 12, and 13 have been canceled, the rejection as applied to these claims is rendered moot.

Applicants traverse the rejection, as it might apply to the new and amended claims, including claims dependent therefrom, for the reasons given below.

The Office Action alleges, in pertinent part, that the specification is unclear, specifically reciting that "[i]t is unclear what 'areas 110, 310' means (see specification page 6, paragraph 24)," including that it is unclear as what "this is in reference to." Applicants respectfully submit that such allegations are misplaced.

Notwithstanding that that the same parts of the invention appearing in more than one view are always designated by the same reference number, the same reference character is never used to designate different parts, no reference character is mentioned in the description that does

not appear in the drawings, and each reference character appears in the drawings, it is not clear as to how the Action has come to this position.

Nevertheless, Applicants point out at paragraph [0004], the specification states that areas **110** and **310** are nanotube attachment areas on the substrate. As the specification clearly shows such attachment areas on the drawings, and as such attachment areas provide the nucleus for nanotube formation/positioning, one of skill in the art would recognize that Applicants were in possession of the invention as claimed at the time the invention was filed.

Because the reference identifiers at issue meet the standards as set forth in 37 C.F.R. §1.84(p)(4) and (5), and such identifiers are well defined in the specification, one of skill in the art could envision the nanotube attachment areas **110** and **310** on a substrate as disclosed, and would appreciate that the inventors were in possession of the claimed invention at the time the invention was filed.

For these reasons, Applicants respectfully request that the rejection be withdrawn.

Rejections Under 35 U.S.C. §112, Second Paragraph

Claims 1-21 stand rejected under 35 U.S.C. §112, second paragraph, as allegedly being indefinite. As claims 7, 10, 13, and 14 have been canceled, the rejection as applied to these claims is rendered moot.

Applicants traverse the rejection as it might apply to the new and amended claims, including claims dependent therefrom, for the reasons given below.

Regarding the clarity of the removing step, while Applicants do not acquiesce to the reasoning offered in the Office Action, and to expedite prosecution toward allowance, the claims have been amended to more clearly define the invention.

Regarding claim 15, Applicants have amended the claim according to the suggestion offered in the Action.

For these reasons, Applicants respectfully request that the rejection be withdrawn.

Rejections Under 35 U.S.C. §103

Claims 1, 5-14, 18, 20, and 21 stand rejected under 35 U.S.C. §103(a), as allegedly being unpatentable over Mau et al. in view of Dai et al. As claims 7, 10, 13, and 14 have been canceled, the rejection as applied to these claims is rendered moot.

Applicants traverse the rejection as it might apply to the new and amended claims, including claims dependent therefrom, for the reasons given below.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First there must be some suggestion or motivation in the references themselves or in knowledge generally available to one of skill in the art, to modify the reference or combine the reference teachings. Second, there must be a reasonable expectation of success. And, finally the prior art reference (or references when combined) must teach all claim limitations. The teaching or suggestion and reasonable expectation of success must both be found in the prior art and not in Applicants' disclosure. (See M.P.E.P. §706.02(j)).

Applicants submits one of skill in the art would have no expectation of success because the combined references 1) would not teach all of the claim limitations and 2) teach away from the present invention, thus the skilled artisan would not be motivated to combine the reference teachings.

The Office Action alleges, in pertinent part, that Mau '801 teaches polymer removal and is silent with respect to teaching catalytic nanoparticles. The Action then provides Dai '526 to cure the deficiency identified in the primary reference. However, review of Mau '801 demonstrates that the reference does not teach removal of the polymer because polymer material **must** remain behind after carbonization to provide a region on the substrate which is incapable of supporting nanotube growth (column 3, lines 10-12). Further, because Mau '801 requires pyrolysis for nanotube formation (column 3, line 66 to column 4, line 44) and Dai '526 teaches that nanotube growth involves avoiding pyrolysis (column 5, lines 24-26) under the conditions of Mau '801 (column 6, lines 47-50), the references taken in combination teach away, since they would produce a seemingly inoperative method.

The Action expressly states that the Mau '801 reference teaches the step of removing a polymer, citing column 2, lines 33-35, and Figure 2a to allegedly show the "self-assembled

polymer" being removed. Respectfully, the Action has mischaracterized the disclosure and the illustration, because the self-assembling monolayer (SAM) and added polymer are two separate molecular entities. Notwithstanding, review of Figure 2a and text for the micro-contact printing process (i.e., the process illustrated in FIG. 2a, see, BRIEF DESCRIPTION OF THE DRAWINGS for FIG. 2a and column 3, lines 17-33) demonstrates that the SAM is added using a polydimethylsiloxane (PDMS) stamp (column 3, lines 22-24), which monolayer is represented by the short parallel lines perpendicular to the substrate (first step in the diagram of FIG. 2a). The polymers (symbolized by "half moons" in second step in the diagram of FIG. 2a) are adsorbed in the SAM free regions subsequent to region specific SAM transfer (column 2, lines 17-21). After carbonization, **polymer material remains behind** (i.e., "half moons" remain throughout the diagrammed stages of FIG. 2a) to serve to pattern the substrate for subsequent nanotube formation (at column 2, lines 36-39). Further, the passage cited in the Action (i.e., column 2, lines 36-39) implicitly supports the fact that polymer material remains attached to the substrate (i.e., "synthesizing a layer of aligned carbon nanotubes on regions of said substrate to which the carbonized polymer is not attached . . ."). Because polymer material (which includes heat stabilized, cross-linked polymers; see, e.g., column 3, lines 54-56) **must** remain on the substrate for the pattern to be produced, Mau '801 does not teach removal of the polymer. This deficiency identified in Mau '801 (i.e., does not teach polymer removal) is not cured by Dai '526.

Regarding "teaching away," In re Gurney, 31 U.S.P.Q.2d 1130, 1131 (Fed. Cir. 1994), states that "[a] reference may be said to teach away when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference. . .", further, the court in Gurney stated that references taken in combination teach away when they would produce a "seemingly inoperative" invention (citing In re Sponnoble, 160 U.S.P.Q. 237, 244 (CCPA 1969)). Under Gurney, a known or obvious invention does not become patentable simply because it has been described as somewhat inferior to some other invention for the same use. (In re Gurney, at 1131). However, "when the prior art contains apparently conflicting references," each reference must be weighed "for its power to suggest solutions to an artisan of

ordinary skill." In re Young, 18 U.S.P.Q.2d 1089, 1091 (Fed. Cir. 1991). In the present case, the conflicting teachings regarding the use of pyrolysis would discourage the skilled artisan from following the path set out in the references because to combine them would produce a seemingly inoperative method. Further, in view of such conflict, the Action has failed to meet the standard as set forth in In re Young.

Mau '801 expressly states:

> " The carbon-containing material [substrate for nanotube formation] may be any compound or substance which includes carbon and which is capable of forming nanotubes when subjected to pyrolysis[1] in the presence of a suitable catalyst." Column 3, line 66 to column 4, line 2. Further, Mau '801 teaches that pyrolysis was carried out at 800-1000° C. (see, e.g., column 6, lines 47-50).

Dai '526 expressly states:

> "For SWNT [single walled nanotubes] synthesis, the silicon substrate is subject to chemical vapor deposition. For example, the support structure is exposed to a carbon containing gas such as methane and heated to approximately 900° C. for 15 minutes in a 1-inch Lube furnace under a methane flow rate of 1000 mL/min. In one particular embodiment, methane is used as the carbon containing gas. However, any carbon containing gas that does not pyrolize at 800° C. to 1000° C. will suffice." Column 5, lines 18-26.

Therefore, the synthesis of nanotubes for Mau '801 and Dai '526 are directly conflicting with regard to the use of pyrolysis because the carbon source for nanotube synthesis in Mau '801 must be pyrolyzed to initiate nanotube synthesis and the carbon source in Dai '526 must be resistant to pyrolysis under the conditions as described in Mau '801. Therefore, the skilled artisan would be discouraged from following the nanotube synthesis path set out in the Mau '801 in view of the nanotube synthesis path in Dai '526, and vice versa. And, as such a combination would lead to a seemingly inoperable method, Mau '801 and Dai '526 teach away. Moreover,

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[1] The plain definition of pyrolysis is the decomposition or transformation of a compound caused by heat (see, e.g., http://www.thefreedictionary.com/pyrolysis).

because of this conflict, it was incumbent on the Action to weigh the suggestive power of each reference (see, M.P.E.P. at §2143.01(II)), and it is apparent from the Action that such weighing was not done.

Because the teachings of Mau '801 would not result in a method comprising removal of a polymer for nanotube formation when combined with the teachings of Dai '526, one of skill in the art would not have an expectation of success since the invention as claimed would not be achieved in view of such teachings. Further, because the teachings of the cited references are in conflict, where such teachings would result in a seemingly inoperative method, one of skill in the art would not be motivated to combine the cited references.

Applicants submit that because there is no reasonable expectation of successfully achieving the invention as claimed, and there is no motivation to combine the cited references, no *prima facie* case for obviousness exists. For these reasons, Applicants respectfully request that the rejection be withdrawn.

Claims 2-4 stand rejected under 35 U.S.C. §103(a), as allegedly being unpatentable over Mau et al. in view of Dai et al as applied to claim 1, and further in view of Herr 2004/0072994.

Applicants traverse the rejection as it might apply to the new and amended claims, including claims dependent therefrom, for the reasons given below.

The Office Action alleges, in pertinent part, that neither Mau '801 nor Dai '526 teach the use of a polymer that is a peptide, protein, or nucleic acid. The Action then provides Herr '994 to cure the deficiency identified in the primary and secondary references. As stated above, the combination of Mau '801 and Dai '526 1) would not teach all of the claim limitations and 2) teach away from the present invention, thus the skilled artisan would not be motivated to combine the reference teachings for the reasons as stated above. Herr '994 does not cure the deficiencies identified in the primary reference, nor does Herr '994 provide any evidence to weigh the suggestive power of each reference in view of the conflict identified between the primary and secondary reference to suggest solutions to an artisan of ordinary skill.

Therefore, there is no reasonable expectation of successfully achieving the invention as claimed and no motivation to combine the cited references, thus, no *prima facie* case for

obviousness exists. For these reasons, Applicants respectfully request that the rejection be withdrawn.

Claim 15 stands rejected under 35 U.S.C. §103(a), as allegedly being unpatentable over Mau et al. in view of Dai et al as applied to claims 1, 9, 11, and 13, and further in view of Chan 6,696,022. As claim 13 has been canceled, the rejection as applied to this claim is rendered moot.

Applicants traverse the rejection as it might apply to the new and amended claims, including claims dependent therefrom, for the reasons given below.

The Office Action alleges, in pertinent part, that Mau '801 does not teach how it aligns the polymer molecule. The Action then provides Chan '022 to cure the deficiency identified in the primary (and secondary) reference. As stated above, the combination of Mau '801 and Dai '526 1) would not teach all of the claim limitations and 2) teach away from the present invention, thus the skilled artisan would not be motivated to combine the reference teachings for the reasons as stated above. Chan '022 does not cure the deficiencies identified in the primary reference, nor does Chan '022 provide any evidence to weigh the suggestive power of each reference in view of the conflict identified between the primary and secondary reference to suggest solutions to an artisan of ordinary skill.

Therefore, there is no reasonable expectation of successfully achieving the invention as claimed and no motivation to combine the cited references, thus, no *prima facie* case for obviousness exists. For these reasons, Applicants respectfully request that the rejection be withdrawn.

Claim 17 stands rejected under 35 U.S.C. §103(a), as allegedly being unpatentable over Mau et al. in view of Dai et al as applied to claim 1, and further in view of the Bonard reference (Bonard).

Applicants traverse the rejection as it might apply to the new and amended claims, including claims dependent therefrom, for the reasons given below.

The Office Action alleges, in pertinent part, that neither Mau '801 nor Dai '526 teach using ferritin as the catalyst for carbon nanotube production. The Action then provides Bonard

to cure the deficiency identified in the primary (and secondary) reference. As stated above, the combination of Mau '801 and Dai '526 1) would not teach all of the claim limitations and 2) teach away from the present invention, thus the skilled artisan would not be motivated to combine the reference teachings for the reasons as stated above. Bonard does not cure the deficiencies identified in the primary reference, nor does Bonard provide any evidence to weigh the suggestive power of each reference in view of the conflict identified between the primary and secondary reference to suggest solutions to an artisan of ordinary skill.

Therefore, there is no reasonable expectation of successfully achieving the invention as claimed and no motivation to combine the cited references, thus, no *prima facie* case for obviousness exists. For these reasons, Applicants respectfully request that the rejection be withdrawn.

Claim 19 stands rejected under 35 U.S.C. §103(a), as allegedly being unpatentable over Mau et al. in view of Dai et al as applied to claim 1, and further in view of Lieber 6,159,742.

Applicants traverse the rejection as it might apply to the new and amended claims, including claims dependent therefrom, for the reasons given below.

The Office Action alleges, in pertinent part, that neither Mau '801 nor Dai '526 teach using biotin-avidin or biotin-streptavidin to bind the polymers to the nanotubes. The Action then provides Lieber '742 to cure the deficiency identified in the primary (and secondary) reference. As stated above, the combination of Mau '801 and Dai '526 1) would not teach all of the claim limitations and 2) teach away from the present invention, thus the skilled artisan would not be motivated to combine the reference teachings for the reasons as stated above. Lieber '742 does not cure the deficiencies identified in the primary reference, nor does Lieber '742 provide any evidence to weigh the suggestive power of each reference in view of the conflict identified between the primary and secondary reference to suggest solutions to an artisan of ordinary skill.

Therefore, there is no reasonable expectation of successfully achieving the invention as claimed and no motivation to combine the cited references, thus, no *prima facie* case for obviousness exists. For these reasons, Applicants respectfully request that the rejection be withdrawn.

Conclusion

Applicants submit that pending claims 1-6, 8, 9, 11, 14-22, 39, and 40 are in condition for allowance. The Examiner is invited to contact Applicants' undersigned representative if there are any questions relating to this submission.

No fee is deemed necessary with the filing of this paper. However, the Commissioner is hereby authorized to charge any fees required by this submission, or credit any overpayments, to Deposit Account No. 07-1896 referencing the above-identified docket number. A duplicate copy the Transmittal Sheet is enclosed.

Respectfully submitted,

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